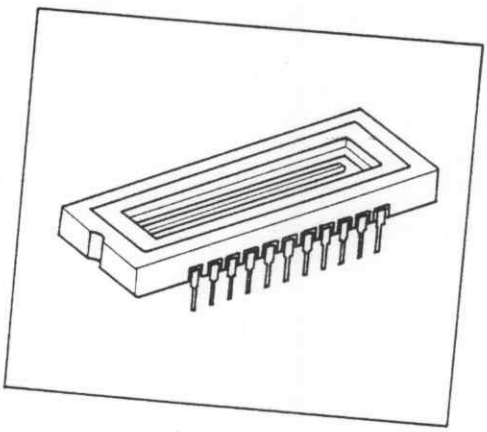
TCD136C

TIVE)

is 520 elements × 3 color (1560
) CCD color liner image sensor.
ice is consist of sensitivity CCD chip.
or fine filter consist of Red, Green,
ilter.
nsor can be used for color copy M/C
or image scanner.



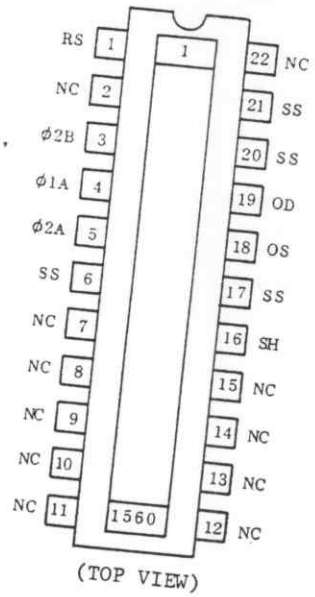
of Image Sensing Elements: 1560 (520 × 3)
Sensing Element Size : 12μm by 47μm on 63.5μm centers
Sensing Region : High sensitive pn photodiode
: 2 phase
Filter : 22 pin DIP
: Red, Green, Blue

RATINGS (Note 1)

AKACTERISTIC	SYMBOL	RATING	UNIT
ulse Voltage	V_ϕ	-0.3~15	V
ulse Voltage	V_{SH}		
ulse Voltage	V_{RS}		
pply Voltage	V_{OD}		
Temperature	Topr	-25~60	°C
Temperature	Tstg	-40~85	°C

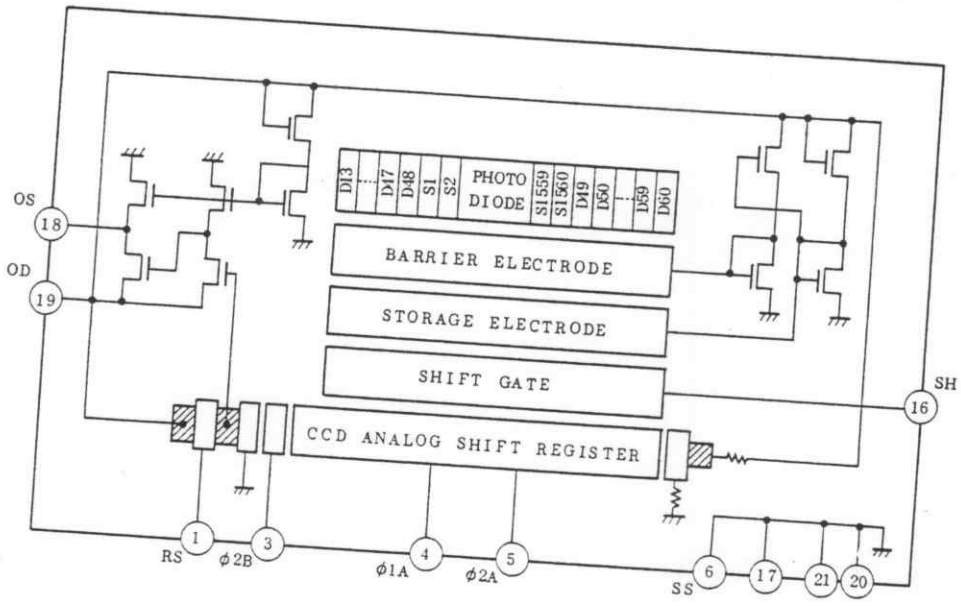
All voltage are with respect to SS terminals (Ground)

PIN CONNECTION



(TOP VIEW)

CIRCUIT DIAGRAM



PIN NAME

Φ1A	Clock (Phase 1)	OS	Signal Output
Φ2A	Clcok (Phase 2)	OD	Power
Φ2B	Final Stage Clock (Phase 2)	SS	Ground
SH	Shift Gate	NC	Non Connection
RS	Reset Gate		

ECTRICAL CHARACTERISTICS

V_{OD}=12V, V_ϕ=V_{RS}=V_{SH}=12V (PULSE), f_ϕ=1MHz
EGRATION TIME)=10ms, LIGHT SOURCE=A LIGHT SOURCE +CM500 FILTER (t=1.0mm)
ISTANCE=100kΩ

ARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
y (Red)	R_R		2.5		V/lx·sec	(Note 2)
y (Green)	G_R		2.3		V/lx·sec	(Note 2)
y (Blue)	B_R		0.9		V/lx·sec	(Note 2)
nse Non Uniformity	PRNU	-	-	10	%	(Note 3)
Output Voltage	V_{SAT}	0.8	1.0	-	V	(Note 4)
Exposure	SE		0.4		lx·sec	(Note 5)
Voltage	V_{DRK}	-	5	10	mV	(Note 6)
Non Uniformity	DSNU	-	-	5	mV	(Note 7)
ssipation	PD	-	80	150	mW	
fer Efficiency	TTE	92	95	-	%	
dance	Z_O	-	0.4	1.0	kΩ	
ge	DR	-	160	-		(Note 8)
oltage	V_{OS}	3.0	-	8.0	V	(Note 9)

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(Note 2) Responsivity is defined for each color of signal outputs average when the photosensitive surface is applied with the light of uniform illumination and uniform color temperature.

(Note 3) PRNU is defined for each color on a single chip by the expressions below when the photosensitive surface is applied with the light of uniform illumination 1 and uniform color temperature.

$$PRNU = \frac{\Delta X}{\overline{X}} \times 100 \ (\%)$$

where $\overline{X}$ is average of referred outputs and ΔX is the maximum deviation from $\overline{X}$.

The amount of the incident light is shown below.

$$\text{Red} = \frac{1}{2} SE$$

$$\text{Green} = \frac{1}{2} SE$$

$$\text{Blue} = \frac{1}{4} SE$$

(Note 4) V_{SAT} is defined as minimum saturation output voltage of all effective pixels.

(Note 5) Definition of SE: $SE = \frac{V_{SAT}}{R}$

(Note 6) V_{DRK} is defined as average dark signal voltage of all effective pixels.

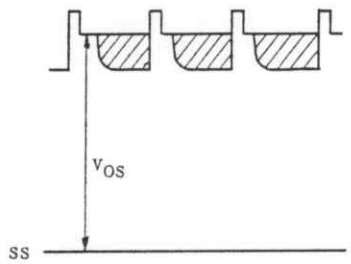
(Note 7) DSNU is defined as different voltage between V_{DRK} and V_{MDK}.
when V_{MDK} is maximum dark voltage.

(Note 8) Definition of DR: DR

$$DR = \frac{V_{SAT}}{V_{DRK}}$$

V_{DRK} is proportional to t_{INT} (INTEGRATION TIME). So the shorter t_{INT} is the wider DR is.

(Note 9) DC output voltage is defined as follows:

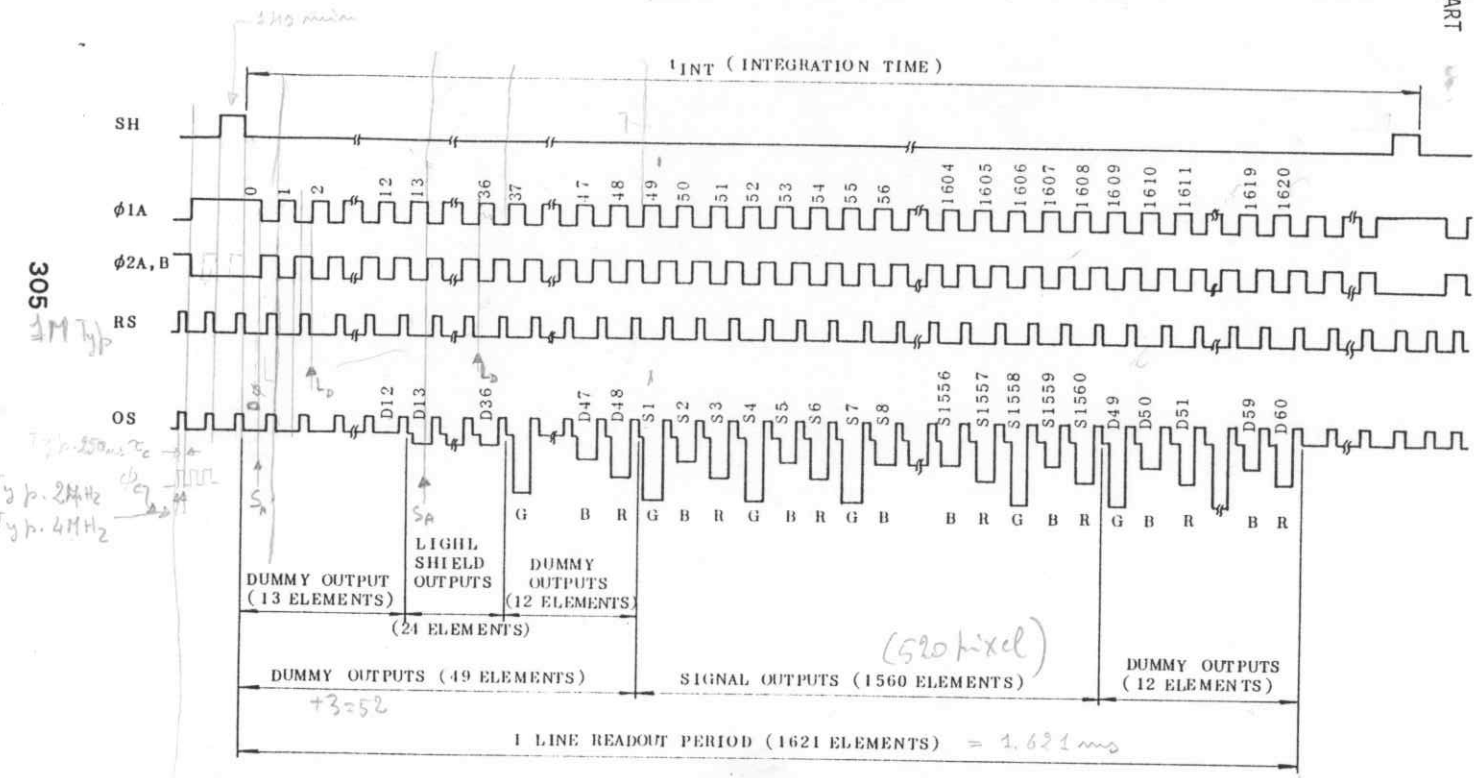


OPERATING CONDITION

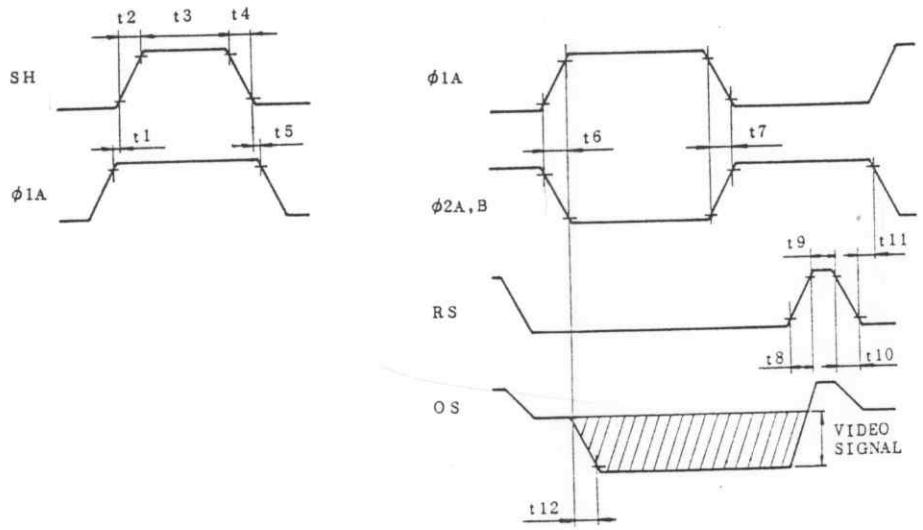
CHARACTERISTIC		SYMBOL	MIN.	TYP.	MAX.	UNIT
Clock Pulse Voltage	H-Level	$V\phi 1A, V\phi 2A$	11	12	13	V
	L-Level		0	0.5	0.8	
Final Stage Clock Pulse Voltage	H-Level	$V\phi 2B$	11	12	13	V
	L-Level		0	0.5	0.8	
Shift Pulse Voltage	H-Level	V_{SH}	11	12	13	V
	L-Level		0	0.5	0.8	
Reset Pulse Voltage	H-Level	V_{RS}	11	12	13	V
	L-Level		0	0.5	0.8	
Power Supply Voltage		V_{OD}	11.4	12	13	V

CLOCK CHARACTERISTICS (Ta=25°C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Clock Pulse Frequency	$f\phi$	-	1		MHz
Reset Pulse Frequency	f_{RS}	-	1		MHz
Clock Capacitance	$C_{\phi A}$	-	450	700	pF
Final Stage Clock Capacitance	$C_{\phi B}$	-	20	40	pF
Shift Gate Capacitance	CSH	-	200	300	pF
Reset Gate Capacitance	CRS	-	10	20	pF


tINT (INTEGRATION TIME)
SH
φ1A
φ2A, B
RS
OS
0 1 2 12 13 36 37 47 48 49 50 51 52 53 54 55 56 1604 1605 1606 1607 1608 1609 1610 1611 1619 1620
D12 D13 D36 D47 D48 S1 S2 S3 S4 S5 S6 S7 S8 S1556 S1557 S1558 S1559 S1560 D49 D50 D51 D59 D60
G B R G B R G B R G B R G B R G B R G B R
DUMMY OUTPUT (13 ELEMENTS)
LIGHT SHIELD OUTPUTS
DUMMY OUTPUTS (12 ELEMENTS)
(24 ELEMENTS)
DUMMY OUTPUTS (49 ELEMENTS)
SIGNAL OUTPUTS (1560 ELEMENTS)
DUMMY OUTPUTS (12 ELEMENTS)
1 LINE READOUT PERIOD (1621 ELEMENTS)

TIMING REQUIREMENTS



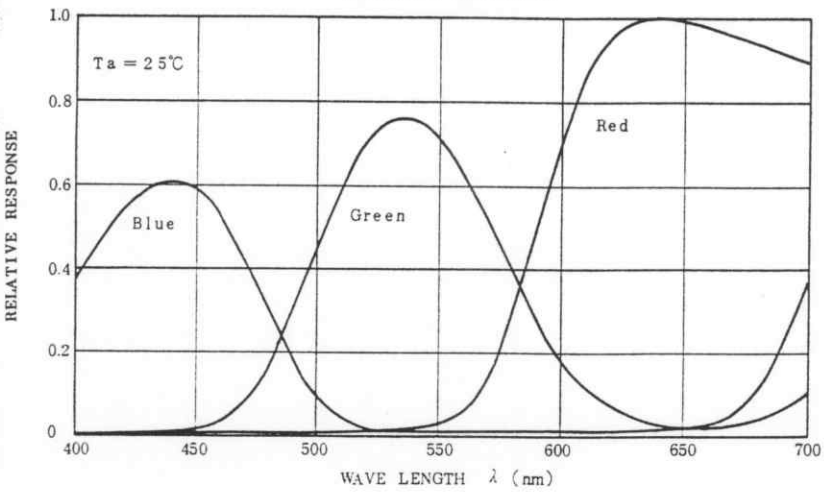
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Pulse Timing of SH and φ1A	t1,t5	0	100	-	ns
SH Pulse Rise Time, Fall Time	t2,t4	0	50	-	ns
SH Pulse Width	t3	1000	5000	-	ns
φ1A, φ2A, B Pulse Riset Time, Fall Time	t6,t7	0	100	-	ns
RS Pulse Rise Time, Fall Time	t8,t10	0	50	-	ns
RS Pulse Width	t9	40	250	-	ns
Pulse Timing of φ2B and RS	t11	0	250	-	ns
Video Data Delay Timing	t12	-	50	-	ns

(Note 11) TYP. is the case of f_{RS}=1MHz.

(Note 12) Load Resistance is 100kΩ.

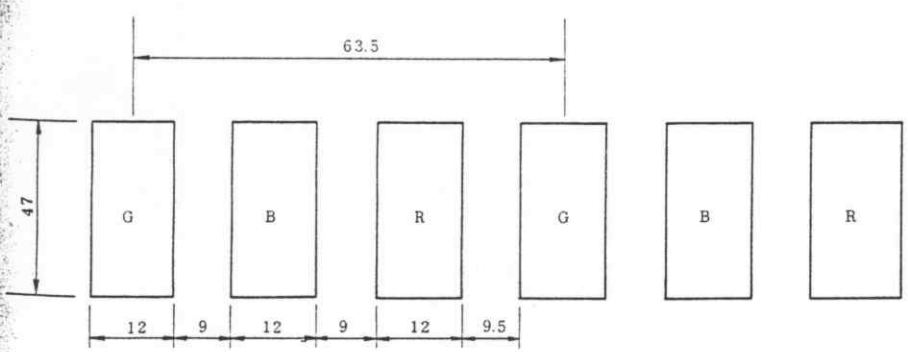
ERFORMANCE CURVES

SPECTRAL RESPONSE



SHAPE

Unit in μm



CAUTION

1. Window Glass

The dust and stain on the glass window of the package degrade optical performance of CCD sensor.
Keep the glass window clean by saturating a cotton swab in alcohol and lightly wiping the surface, and allow the glass to dry, by blowing with filtered dry N2. Care should be taken to avoid mechanical or thermal shock because the glass window is easily to damage.

2. Electrostatic Breakdown

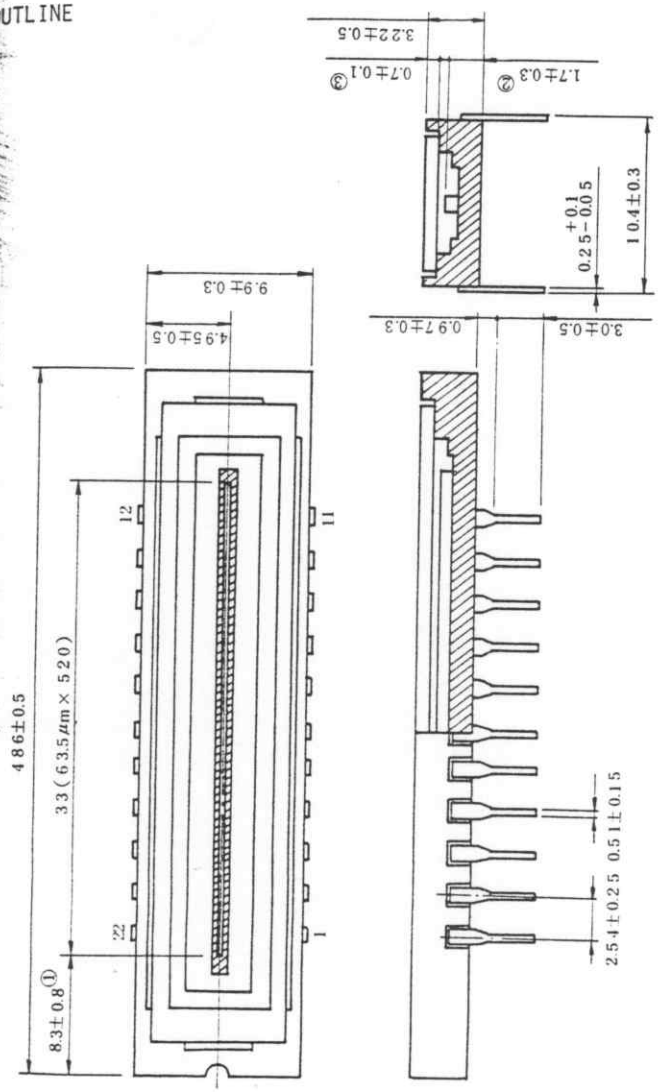
Store in shorting clip or in conductive foam to avoid electrostatic breakdown.

3. Incident Light

CCD sensor is sensitive to infrared light.
Note that infrared light component degrades resolution and PRNU of CCD sensor.

E OUTLINE

Unit in mm



1 No.1 SENSOR ELEMENT (S1) TO EDGE OF PACKAGE.

2 TOP OF CHIP TO BOTTOM OF PACKAGE.

3 GLASS THICKNESS (n=1.5)

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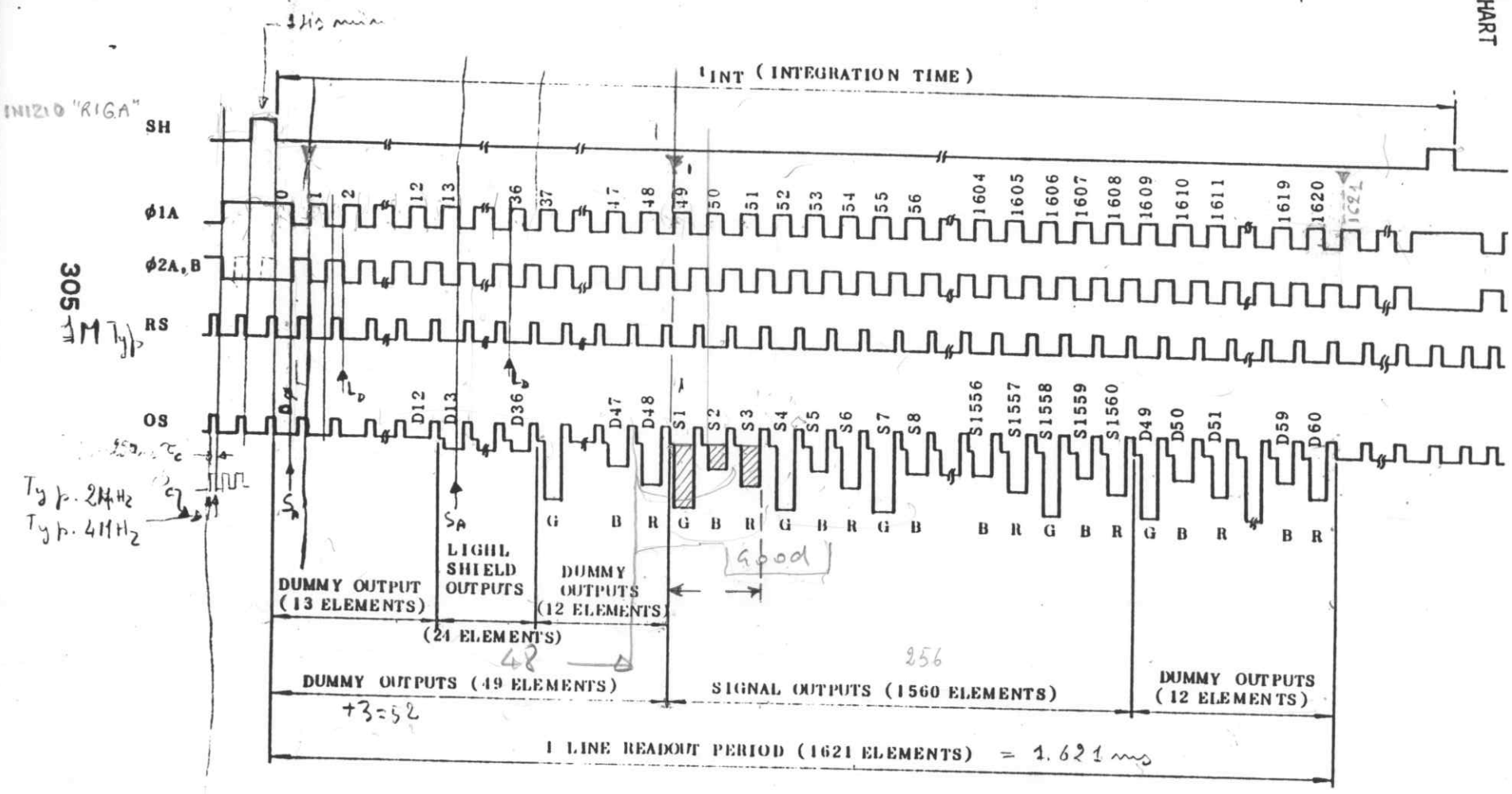


305 ± M Typ

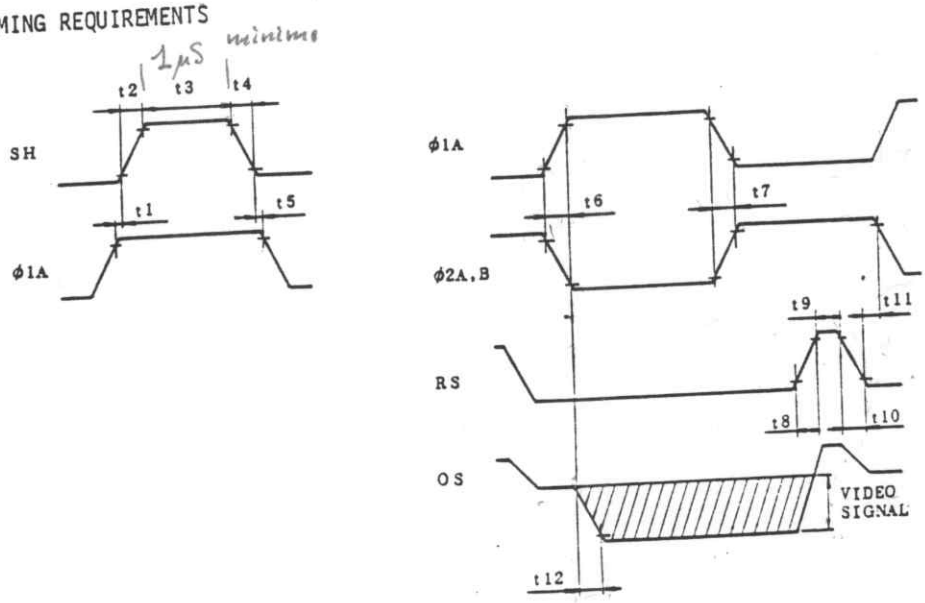
CHART

TCD136C

+1. 1623 EP.

3+
1626 (Divisibile per 6)

TIMING REQUIREMENTS



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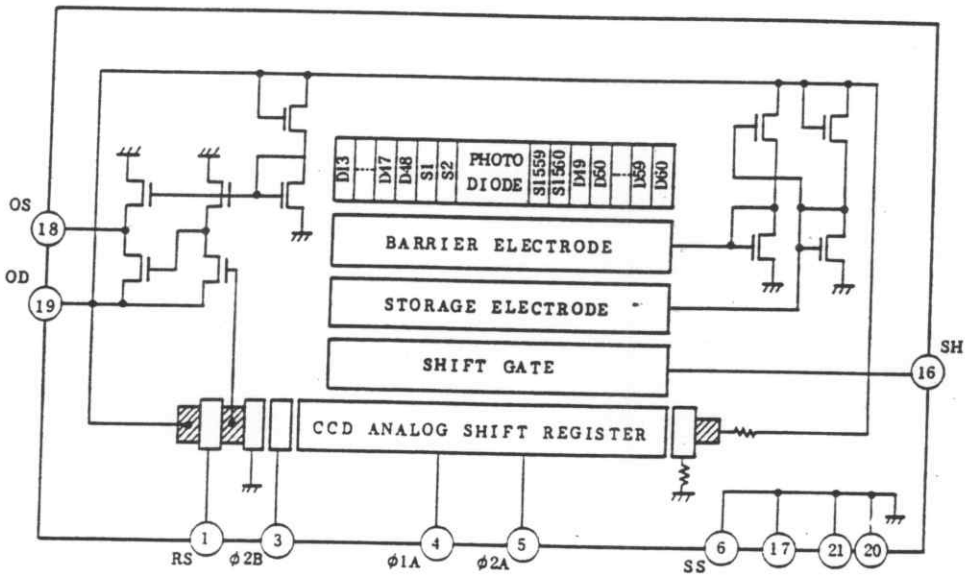

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